

PATENT ABSTRACTS OF JAPAN

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IGATA MITSURU

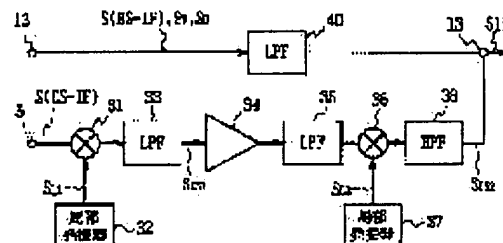
NUMAZATO HIKARU

(54) MIXING SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a mixing system capable of mixing two signals duplicate in frequency.

SOLUTION: A 1st input signal $S(\text{CS-IF})$ is frequency-converted into a frequency band different from that of the 1st input signal $S(\text{CS-IF})$, and a 1st frequency conversion signal SCS1 subjected to frequency conversion is converted into a frequency band that differs from that of the 1st frequency conversion signal SCS1 and from that of a 2nd input signal $S(\text{BS-IF})$. Thus, the frequency band of the 1st input signal $S(\text{CS-IF})$ and the 2nd input signal $S(\text{BS-IF})$ is converted into a different frequency band and then the two input signals are mixed and the mixed signal is sent through one cable.



4

图2 一轴伝送混合器

1

y' z ~ z
 yz Pz P g ~ Ø P ~ M ~
 * L P g di • Ø g ~ Ø Q
 ~ M ~ < • Ø < u æ ç ~ A
 * L P ~ M Y P ~ M g
 ~ Ø g g ~ • Ø P g ~
 Li ~ A
 * L P g ~ • Li ~ g ~ • † æ %
 P g ~ • M A Y P g ~ • M
 g ~ Ø ~ * L Q ~ M g 10
 ~ Ø g ~ • Ø Q g ~ • L
 i ~ f Ø ~ ~ ¥ ~ • Ø < u B
 yz Qz * L P ~ M ~ M q fl' æ , †
 æ Ø æ g M ~ Ø g M ~ L A
 * L Q ~ M ~ * L M q fl' ~ Ø æ q fl
 ' æ , † æ Ø æ g M ~ Ø g M ~
 Ø ~ ~ ¥ ~ • Ø z P L < u B
 y > z
 y O O O P z
 y z ~ ~ ~ (> • Ø B 20
 y O O O Q z > fi • Ø Z p ~
] Z p
 > ~ / ~ • Ø Li } S j
 L • Ø % Li
 > { ~ i } P ~ } R j
 > i ~
 y O O O R z
 y > fi • Ø Z p ~ z (> ~ < u A
 q flæ æ M M < • Ø < u K p
 ~ D K ~ Ø B 30
 y O O O S z
 y] Z p z N A e r W æ ~ g ~
 ~ u g e (Very High Frequency) g p % æ i ~
 ~ - æ u g e æ ~ j y t g e (Ultra High Fr
 equency) g p % æ i ~ - æ t g e æ ~
 j n * g æ ~ f ~ A æ I ~ % æ q
 fl i a r : Broadcasting Satellite j Ø q flæ ~
 s æ Ø / ~ ~ ç Ø B q flæ ~ ~ ^ ~
 q fl' æ d g æ , • Ø % R n f m
 æ d g M • Ø - ~ ~ « A % d g ~ s 40
 æ Q æ ~ ~ ç ~ S [X g r [g W Q L ~
 ~ ç % i z ~ ~ æ Ø ~ ~ Ø B
 y O O O T z % Y æ q fl Ø a r æ ~ f ~
 V % ~ M q fl i b r : Communications Satellite j
 g p % b r æ ~ J n † æ A - æ L q flæ ~
 ~ a r æ y b r æ Q ' æ ~ s æ Ø /
 ~ ~ % B
 y O O O U z
 y > ~ / ~ • Ø L z ~ - ~ ~ } S f .
 / A a r æ ~ ~ A e i ~ M % a r æ g ~ 50

2

g 1032 1335 kHz l g ~ • A %
 b r æ ~ ~ b r A e i ~ M % b r æ g ~
 g 1050 1550 kHz l g ~ • ~ ç Ø %
 g ~ d i A M % a r æ g y b r
 æ g fl P [u p ç ~ ~ % æ A ç M
 g ~ ~ / ~ ~ Ø B
 y O O O V z - % æ f , A a r æ ~ u g e y t
 g e æ æ ~ ç ~ g ~ f æ ~ ç Ø %
 fl P [u p ç ~ M % M ~ A b r æ
 M • Ø æ ~ a r æ M M ~ • Ø P
 { u ~ ~ Ø P [u p ç ~ ~ ~ f l æ , ~
 ~ ç B - % b r æ M M P [u ~
 fi O A e i ~ fi ~ [i L % A
 ø ~ † æ % a r p P [u ~ f ~ V % b r p
 P [u ~ • Ø ~ ç ~ % ~ G ~ ~ ~ K v
 ~ Ø L ~ ~ % B
 y O O O W z { > ~ ~ ~ ~ l q ~ ~ † æ %
 ~ A ç g ~ d i • Ø Q ~ M < Ø <
 u æ ~ / ~ • Ø ~ Ø B
 y O O O X z
 y L • Ø % L i z ~ ~ Ø L • Ø %
 { > ~ ç ~ ~ A P ~ M Y P ~ ~
 M g ~ ~ Ø g g ~ • A
 Y g ~ • † æ % P g ~ • M Y P
 g ~ • M g ~ ~ Ø ~ ~ Q
 ~ M g ~ ~ Ø g ~ • Ø -
 ~ L A P ~ M y Q ~ M g
 ~ Ø g ~ • Ø - ~ ~ ~ « A ' > ~ -
 æ Q ~ ~ M < ~ ~ P ~ P [u ~ ~ •
 Ø - ~ ~ ~ ~ Ø B
 y O O P O z
 y > { ~ z ~ ~ } ~ ~ ç ~ A { > æ
 { ~ q • Ø B
 y O O P P z } P ~ ç ~ P ~ S ~ ~ q flæ y
 n * g æ M • Ø M V X e f A æ q fl
 i a r F Broadcasting Satellite) p ~ n * æ
 , † æ Ø 12 [GHz] a r æ g d w ~ ~ A a r A e
 i U ~ ~ M † æ % ~ A Y a r A e i U fi
 æ % a r R o [^ U ~ ~ P [GHz] i 1032 ~
 1335 [MHz]) a r g M r (BS-IF) g ~
 • † æ Ø B - a r g M r (BS-IF) ~ fi † P [u
 V ~ ~ < W a r p ~ [q W ~ ~ †
 æ Ø B
 y O O P Q z % A n * æ { i p j
 æ , † æ Ø u g e (Very High Frequency) n * g
 i e r W æ g j d w y t g e (Ultra High
 Frequency) n * g i e r W æ g j d v
 ~ ~ A n * g p A e i X ~ ~ M † æ A u g e
 i 90 ~ 222 [MHz]) e r W M M ~ y t g
 e (470 ~ 770 [MHz]) e r W M M ~ ~

3

~fl+P[u PO ~< W n*gp ~[
 qWa ~+E0B< W"arpA eiUy
 n*gpA eiX rI cfio fl E~c
 0B
 yOOPRz--AarR o[^U` ~
 E0ar gM r(BS-IF) ~An*gpA ei
 X ~ E0e rW MM r y E
 ~"A»E...E "0 g " L ~ E~c0-
 ~ LA< W"-E < Afl+P[u P
 P ~{> 0< u~ ~ E+` < 10
 S P "[qPQ ~.0-~"-«0B
 yOOPSz-E ~"A'Mqflibr KCommunic
 ations Satellite) p ~n* e,+E0L2[GH
 z] bræ gdw: ~Abra eiQ ~
 M+E%*A YbrA eiQ fl E&brR
 o[^Q` ~P[GHz] il050 `1550[MHz])
 br gM r(CS-IF) g ~. +E0B-
 br gM r(CS-IF) ~fl+P[u R
 ~E+` < S Q "[qT ~+E0B
 - E+` < S"A=q < W~fl eA 20
 eiiarpA eiUAN*gpA eiXy b
 rpA eiQj rI cfio fl E~c0B
 yOOPTz--Ae+` < S Eß "[
 qT ~+E0br gM r(CS-IF) g
 (1050 `1550[MHz]) ~A YE+` < S ...ß
 "[qPQ ~+E0ar gM r(BS-I
 F) g (1032 `1335[MHz]) ~d""~c0B]
 ~ YE+` < S"A "[qT ~+E0
 br gM r(CS-IF) A "[qPQ ~+
 E0e MM i gM r(BS-IF) Ae rW 30
 MM r y E j g ~" "0 g
 g ~. .0-~ LA-E e MM i
 gM r(CS-IF) A gM r(BS-IF) Ae
 rW MM r y E j < ~E+`
 .0 / ~+E~c0B
 yOOPUZ~" } Q æc~E+` < S
 "A "[qT ~+E0br gM r(CS-I
 F) Pi ~LTRP ~.0B~LTRP~
 ~>U RQ' E0 g 1950[MHz] M
 i"-E P [J M ~ jn, br 40
 gM r(CS-IF) Z.0-~ ~br
 gM r(CS-IF) g (1050 `1550[MHz]) y
 [J M E, g (1950[MHz]) . g (4
 00 `900 [MHz]) ~"0Eç g M i_E R o[
 g<"j ¶ < A-E -> [pXtC ^iko
 ejRR o.0B
 yOOPVz [pXtC ^RR~_E R o[g
 <"(400 `900 [MHz]) o -E Pi
 g ~.M E:, ~ ~-> æHRS o.
 0B] ~} Ri`j f. / A1050 `1550[MHz] 50

4

g ~"0br gM r(CS-IF) ~400 `90
 0 [MHz] P g ~.M E:, g ~. +
 E~ æHRS ~+E0-~ "0B A-
 P g ~.M E:, ~Atge e rW
 MM E ~d; .0B
 yOOPWz æHRS ~Pi g ~.M
 E:, L x %*A-E [pXtC
 ^RT o.0B [pXtC ^RT" æH
 RS æc~ +E% Pi g ~.M r
 cs: mCY<" A-> Qi ~LTRU
 o.0B
 yOOPXz~LTRU~ ~>U RV' E0
 g 2295[MHz] [J M E:, Pi g
 ~.M E:, Z.0-~ ~ Y Pi
 g ~.M E:, g (400 `900 [MHz]) y
 [J M E:, g (2295[MHz]) . g (1
 395 `1895[MHz]) ~"0M ¶ <.0B- M ~
 Qi g ~.M E:, ~ ~->nCpXtC
 ^igoejRW ~E+` < S o"[
 qPR o+E0B'> ~} Riaj f. /
 A400 `900 [MHz] g ~"0 Pi g
 ~.M E:, ~1395 `1895[MHz] g ~"0 Q
 i g ~.M E:, g ~. +E~o"[
 qPR o+E0-~ "0B A- Q
 g ~.M E:, ~Atge e rW MM
 E Auge e rW MM E
 y ar gM r(BS-IF) ç, E
 d; "ç - L' ar gM r(BS-I
 F) " g (1335 [MHz]) ~60[MHz] u
 u~% ~"0B % Y Qi g ~.M
 E:, " g 1895 [MHz]) ~A=q.0"z
 [i " 0" g ~ E v.0
 / " g ~ 0B
 yOQQOz' '0br gM r(CS-IF)
 ~Ae+` < S P "[qPQ ~+E
 0ar gM r(BS-IF) Ae rW MM
 E y E "A [pXtC ^SO ~o"[
 qPR o+E0B'> ~E+` < S o"
 [qPR' "A ç "d; ~car g
 M r(BS-IF) Auge e rW MM
 E Atge e rW MM E y g
 ~. +E&br gM i Qi g ~.M
 E:, j "< +E~irPRjflfl+P[u
 ~o~+E0B
 yOQQPz- / ~E+` < S o"[
 qPR' < o~+E0ar gM r(BS-IF)
 Auge e rW MM E Atge
 e rW MM E y g ~. +E&br
 gM i Qi g ~.M E:, j ~} P
 f. fl+P[u PS ~fl fl E%*z

5

PT o+@0B
yOOQqz "z PT~@+< S' o+@0
ar gM r(BS-IF) Auge e rW
MM r Atge e rW MM r y
g ~. +@&br gM i Qi g
~. M r:: j < &M Qn "flA@
B o~[qPT'~ fl+P[u PU ~br
~ [iPV o A...B o~[qPTa' fl+
P[u PX ~"g Q0 o.0B
yOOQRzbr' [iPV"< MM iar 10
gM r(BS-IF) Auge e rW MM
r Atge e rW MM r y g
~. +@&br gM i Qi g ~.
M r:: jj ' , A g ~. +@&br
gM i g ~. M r:: j o A-@
&A [U ~I +@&' l
.0f M br Lo.~ Aob
l(Pulse Code Modulation) M " ' g.0-
~ ~fCW^ M ' Ai O "M br
~. ~ Lo.B- / ~ Lo+@&f 20
M br y "M br "e rW @
QP f ^ "M ~[qQS o+@A [U
&f~f' ~f+@0B
yOOQSz Abr' [iPV~fl+P[u
PUAPSAPPAVy R ~@+<
SABrR o[^y arR o[^ fl +.0d
"u d.0 / ~+@~@0B+ - M
VXe l ~@~"br' [iPV' ,g .M
y qfl .M @+< S ~brA
eiQ o.0-~ LABrA eiQ~ ~ 30
f A Er[A ei p@&@ "A "0Q
' 'Mqflibrj' @. +@0 & " ...g
br@ g .f~ M.0-~ "«0B
yOOQTz@BA "g QO "A "z PT'
+@0< MM iar gM r(BS-IF) Au
ge e rW MM r Atge e r
W MM r y g ~. +@&br g
M i Qi g ~. M r:: jj' ar
gM r(BS-IF) Auge e rW MM
r y tge e rW MM r o 40
Aar gM r(BS-IF) P o~[qQO
' fl+P[u QQ ~ar' [i L.0
e rW @QP arM ~[qQP'
o.0~ Auge y tge ee rW
MM r y r fl+P[u QR ~e
rW @QP uge^tge "[qQPa
" .0B
yOOQUze rW @QP~arM ~[
qQP' ~ " .0ar gM r(BS-IF)
L x &A [U ~I 50

6

+@&' l . .0f M y "M
Lo.~ Auge^tge "[qQPa
~ " .0e rW MM r y r
[U ~I +@&' l . .0f M
y "M Lo A [U &f~f
~ ~f.0B
yOOQVz- / brR o[^Q' ~
@0br@ br gM r(CS-IF) (1050
1550[MHz]) ~A@+< S ~fl0Qi g
~. ~1395 1895[MHz] gM i Qi
g ~. M r:: j g ~. +@0-
LAar gM r(BS-IF) Auge e r
W MM r Atge e rW MM
r y g ~. +@&br gM i Qi
g ~. M r:: j "c, @ » g "
d; "c / "LA- "A/ " fl+P[u
PS p@~e MM " .0-~ "«0B
yOOQWz-- "A MVXe P ~@~ "Abr
A eiQ fl @&brR o[^Q' ~ "A»
~ [J g i > U g j " X l
p@0-~ "«0 / ~+@~@0B- @
AbrR o[^Q' [J g " "0~A
YbrR o[^Q' ~@~ g ~. +@&br
gM r(CS-IF) g "0-~ "0B
yOOQXz- { @ AbrR o[^Q
~ [J g ~11.2[GHz] ~ LA- [J
g ~ g ~. +@~ "0br gM
r(CS-IF) g ~1050 1550[MHz] ~ 0B-@
~ "A Ybr gM r(CS-IF) @+< <
S ~ g ~.0-~ ~ @0
gM i)Q 'c~ "q & Qi g ~
~. M r:: j g ~1395 1895[MHz] ~ LAB
r' [iPV~c, @ gM ~ ~ [U
L &' l br' l I 0
/ ~+@~@0B
yOORoz.~ LABrR o[^Q' ~ @
0br gM r(CS-IF) A@+< < S
p@, br' [iPV ~.0@ A Ybr'
[iPV fl @&brR o[^ g LLi
i)f~, j L g 11.2[GHz] L.0-~
LABr gM r(CS-IF) g i1050
1550[MHz]) LU @&e' l I .0-
~ "«0B
yOORPz-@ ~ AbrR o[^Q' ~
@0br gM r(CS-IF) A@+< <
S ~1395 1895[MHz] g ~. ~br'
[iPV ~.0@ A Y g ~. +@&br
gM i r:: j g " g ~. "c~
q br gM r(CS-IF) ~ 345[MHz]
~.0B] ~- @ Abr' [iPV brR

o[^ g L L i i } f , , j L g *
q 11.2[GHz] ' br g M g ~ . " -
0 345[MHz] fl . i c % 10.855[MHz] ~ . 0 -
L A Y br ' [i P V n c ~ F fl . 0 e '
l g ~ ~ « br R o [^ L g
i 10.855[MHz]) ~ V t g A - E L e t '
< S n c ~ g ~ . + E % br g M
i g ~ . M n s : j L U E ~ c 0 e '
l ~ A [U I ~ br R o [^ g
" 11.2[GHz] E ~ fl l I + E 0 B
y O O R Q z A E ~ ~ L T n c ~ g M
y [J M Z . 0 - ~ ~ g M
g ~ . . 0 E A Y ~ . + E % g M
L U E ~ c 0 ' l l g ~ - z a "
t] . 0 " A) Q . ' c ~ a q % / A e t ' <
S n c ~ Q i g ~ . { . - ~ L A b
r g M r (C S - I F) n c ~ » g L
U E % ' l z a " Q i g ~ . M
n s : n c ~ fl E z a 0 B] ~ br ' [i P
V n c ~ ~ A br R o [^ g L L i L 20
g ~ X . 0 fl ~ A br e g L U E & e '
l I . 0 - ~ ~ ~ « 0 B
y O O R R z " a % < n c ~ A br A e i Q b
r R o [^ Q ' n c ~ E & br g M r
(C S - I F) " A e t ' < S ~ L T R P y R U
~ Q a " fl ~ g ~ . + E 0 B
y O O R S z - E A a r g M r (B S - I F)
g d j . 0 br g M r (C S - I F) " P a
g ~ . ~ t g e d j . 0 g (4
00 ' 900 [MHz]) ~ . + E A Q a g ~ . 30
~ a r g M r (B S - I F) A u g e y t g e
e e r W M M n y n c , E
d j " c g ~ . + E 0 B
y O O R T z - Q a g ~ . ~ E &
g i 1395 ' 1895 [MHz]) " A br R o [^ Q '
E 0 g ~ . 0 g i 1050 ' 1550 [MHz])
E d j . 0 " A P a g ~ . 0 a g
i 1050 ' 1550 [MHz] y 400 ' 900 [MHz]) ~ c d j
" c ~ L A Q a g ~ . 0 a g
(400 ' 900 [MHz] y 1395 ' 1895 [MHz]) c d j 40
" c ~ 0 - ~ L A c g " d j . 0
b r g M r (C S - I F) ' Q i g ~ . M
n s : g ~ . " ~ % ~ 0 B
y O O R U z - / fl O fl E & e t ' <
S n c ~ A ~ M M i a r g M r (B
S - I F) A u g e y t g e e e r W M M
n y n j c , E d j " c g ~
. + E & br g M i Q i g ~ . M
n s : j ~ A e M M ~ < + E E { fl t P [u
P S ~ fl fl E & " z P T + E 50

0 B
y O O R V z] ' ~ A e f , a r g M r (B S - I
F) y u g e A t g e e e r W M M
n A n E { fl t P [u P P p c ~ fl
L / " + E % } M V X e e t ' <
S t ' . E , A fl O ' fl ~ + E 0 P [u
e t ' < S ~ + E % fl t P [u P S
~ 0 B - ' A fl O ' fl ~ + E 0 fl t P
[u ~ t , 0 - ~ ~ > br g M i r
c s : j fl L ~ ~ ~ « A P [u
" / ~ ~ H a 0 B
y O O R W z " a % < E , A e t ' < S
p c ~ e M M i a r g M r (B S - I F) A g
~ . + E & br g M i n s : j A u g e y
t g e e e r W M M n y n j
< . 0 - ~ L A E { fl t P [u P S p c ~
e M M ~ . 0 - ~ ~ ~ « A M V X e P %
< " P . 0 - ~ ~ ~ « 0 B
y O O R X z " n a q { ' n c ~ ~ A br
g M r (C S - I F) Q a g ~ . . 0 - ~
~] g 0 E ' c ~ q % " A (>
~ - E , A g ~ . a X a K p
0 B
y O O S O z % a q { ' n c ~ ~ A br
g M r (C S - I F) g ~ . . 0 E ' c ~ q
% " A { > ~ - E , A e f , a r g M
r (B S - I F) g ~ . % L A t ~ ~ X
M M g ~ . ~ fl t P [u ~ . 0 E
L > K p . 0 - ~ ~ ~ « 0 B
y O O S P z
y > i ' z a q / { > E , A P
" M Y P " M g ~ " 0 g
g ~ . A Y g ~ . + E & P
g ~ . M Y P g ~ . M g
~ " 0 ~ ~ Q ~ M g ~ " 0
g ~ . . 0 - ~ L A P " M y
Q " M g " 0 g ~ . 0
~ ~ ~ « A ' > ~ - E Q ' " M < ~
P ' P [u ~ . 0 - ~ ~ ~ « 0 B
y } " P " z
y } P z { > 0 M V X e S % < f . "
} ~ 0 B
y } Q z e t ' < % < f . u c N) ~
0 B
y } R z g M g ~ . . 0 "
} ~ 0 B
y } S z e M M g f . " } ~ 0 B
y z
P c c M V X e A Q c c b r A e i A R A V A P
O A P A P S A P U A P X A Q Q Y Q R c c fl t P [

u A S c c e f ' < A U c c a r A e i A
W A Q O c c " g A P T c c " z . A P V c c b r '

[i A Q P c c e r W M @ B

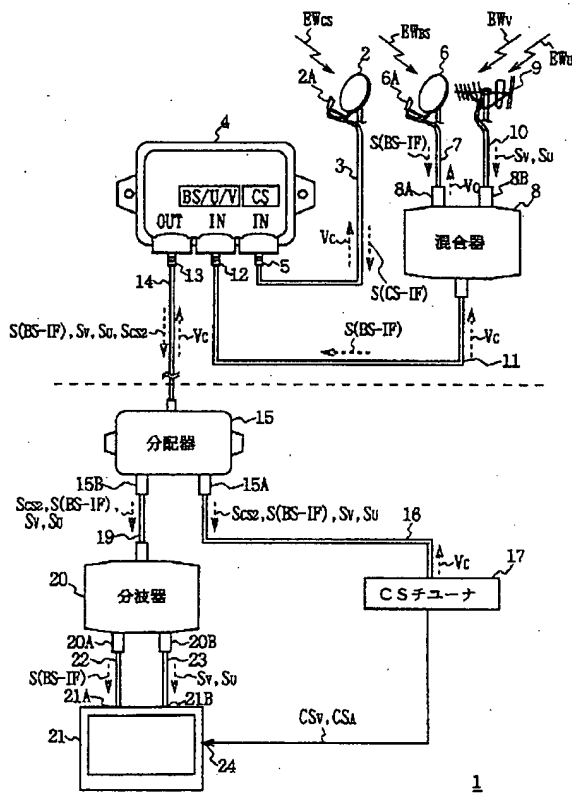
$$y \} P z$$
$$y \} Q z$$


図1 受信システムの全体構成

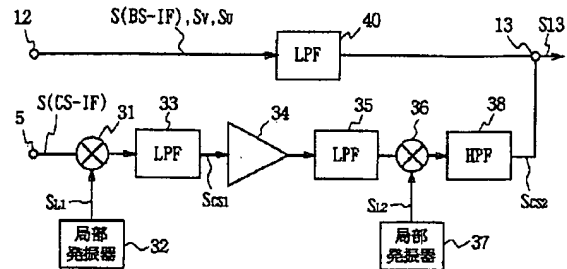


图2 一轴伝送混合器

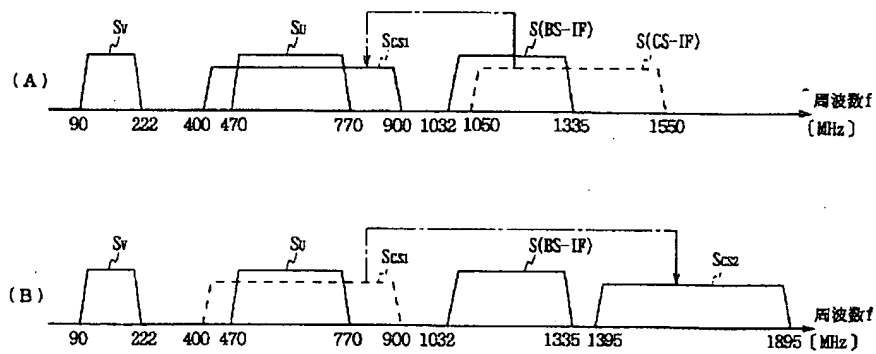
$$y \} R z$$


図3 CS中間周波信号の周波数変換

y) S z

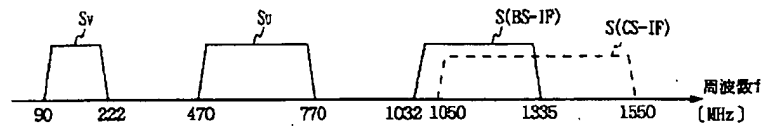


図4 受信信号の周波数帯